

## **Historic, Archive Document**

Do not assume content reflects current scientific knowledge, policies, or practices.



A59



## forest MANAGEMENT bulletin

### TIPS ON IMPROVEMENT CUTTING

By  
Hamlin L. Williston  
Softwood Specialist

OCTOBER 1977

U.S. Department of Agriculture, Forest Service, Southeastern Area, State and Private Forestry, 1720 Peachtree Road, N.W., Atlanta, Ga 30309



*These "wolf" hardwood trees were deadened to release the loblolly pine that had seeded in beneath them.*

The cutover forests of the South usually contain a large proportion of very poor trees – trees that, because of undesirable form, quality, condition, growth rate, or species should be removed to stimulate growth of the better trees. In short, what's needed is an improvement cut.

As an example, in 10 years, improvement cutting converted the ragged growth of half pine and half hardwood of one stand in southern Arkansas to a well-stocked, 34-acre (13.8 ha) stand consisting almost completely of shortleaf and loblolly pine. Initial volumes per acre were 2,012 board feet and 8.06 cords. After 10 years, volumes per acre were 3,022 board feet and 6.82 cords. During the first 29 years of management the owner harvested 219,610 board feet of pine sawtimber, 371 cords of pine pulpwood, 158 cords of hardwood, and 220 fence posts. Even so, the volume left to grow on the average acre was approximately 5,300 board feet and 9.4 cords.

Cull trees, on the average, occupy one-third of the growing space in pine-hardwood and hardwood stands. Usually about one-fourth of the hardwood volume is in sound cull trees, which are usable for pulpwood and other small products. The feasibility of an improvement cut will be determined by the amount and quality of the material to be removed, local market conditions, logging conditions, and the stock of desirable trees left following the cut. Every situation will be different (subject to the local forester's decision), but here are some guidelines:

An improvement cut is practical if, following the cut and attendant deadening operation, at least 40 to 50 percent of the area will be stocked with desirable trees. Under the best market and logging situations it may be possible to sell as little as 500 board feet or 2 cords of pulpwood per acre. In average situations, at least 1,000 board feet or 4 cords per acre should be marked for removal. However, when the tim-

U.S. DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
SOUTHEASTERN AREA



ber to be cut is particularly low grade, it may take a cut of 2,000 board feet per acre to sell.

First, a diagnostic prism cruise of the area is needed. Such a cruise takes but little longer than an informal visual estimate during a walk through the stand and provides concrete data upon which to base a decision. In this cruise, trees should be tallied in major species groups by height and product classes in cut, leave, and cull categories.

### **"FINANCIALLY MATURE" PINE-HARDWOOD STANDS**

In pine-hardwood stands, an improvement cut should be made to remove those trees that are "financially mature" or that interfere with the growth and development of more valuable trees. Financially mature trees include:

1. Badly suppressed trees, which are certain to go out of the stand within the next 5 years through natural mortality.
2. Trees having crooked trunks that will never produce sawtimber.
3. Trees that show unmistakable evidence of red-heart or other tree-destroying fungi.
4. Trees that contain fire scars or other injuries so severe that they are susceptible to wind damage.
5. Extremely bushy or limby trees that will never produce



*In an improvement cut, the rough, limby, loblolly pine on the left will be removed to give the better trees around it more room to grow.*



*A rough pine growing in the open, such as this loblolly, will never "clean up" and should be removed in the improvement cut.*

- lumber of average quality better than Grade No. 2 Common.
6. Limby trees that will never produce at least one No. 2 sawlog, and that interfere with more valuable trees.
7. Mature and overmature pines and hardwoods, largely holdovers from the original stand, of very poor quality and growth rate.
8. All hardwoods except those high quality, fast-growing trees of the best species; those needed for mast production or den trees; and those growing along small streams and in draws where the site is suitable for good hardwood growth.

### **BOTTOMLAND HARDWOODS**

Improvement cutting is especially needed in bottomland hardwood stands because of the great variety of species and the great differences in values among and within species. It is convenient to divide bottomland hardwoods into two classes: Desirable growing stock and overburden. Desirable growing stock includes those trees which should be left for one or more cutting cycles, whatever their present size. Overburden includes (1) those merchantable trees that will not make a net contribution to the value of the stand over the next cutting cycle and therefore should be logged and (2) the cull component of the stand.

What should be classed as overburden? This depends on five considerations:



1. *Species* – Preferred are cherrybark, cow, Nuttall, Shumard, water, and willow oaks; green and white ash; cottonwood; cypress; sweetgum; persimmon; and sweet pecan. Intermediate species are rock, white, and winged elm; hickories, overcup oak; hackberry; willow; red maple; bitter pecan; honeylocust; sycamore; blackgum; and swamp cottonwood. Weeds include boxelder, waterlocust, hawthorn, planertree, ironwood and swamp privet. Local market demands often move species from the intermediate to the preferred class.
2. *Size* – Set sawlog and pulpwood size specifications by species.
3. *Form and quality* – Straight, relatively defect-free trees containing at least one actual or potential high-grade log are in the desirable class. Defects include surface and hidden knots, decay, grub holes, bird peck, bark pockets, ring shake, worm holes, and mineral stain as well as damage by wind, lightning, or ice.
4. *Vigor and thrift* – Remove the poor risks and overmature trees – those that may soon die or are declining in vigor. A number of large overmature trees often must be included to make the "cut" sell.
5. *Position and space occupied* – Remove trees that interfere with better trees, and wolf trees. Thin to stimulate the development of preferred species

Control of cull trees should be carried out immediately after the commercial cut. Deaden rotten culls, sound culls not cut for pulpwood, and weed trees. All trees to be removed in bottomland hardwood stands should be marked by a forester or technician thoroughly trained in hardwood silviculture.

Where the principal effects of stand improvement measures are thinning and release, the risks of opening the canopy too much must be considered. Such risks include establishment of a heavy ground cover of vines and an understory of weed species, and the encouragement of epicormic branching on the hardwoods. When improvement cutting is aimed at obtaining reproduction, openings should be a minimum of ½ acre (0.2 ha) and preferably 1 acre (0.4 ha) or more. Sometimes, trees otherwise worthless must be kept for their seed.

In summary, improvement cuttings pay off in increased growth of high quality timber and reproduction of desirable species. In the process, a large volume of timber is utilized that would otherwise die of natural causes or decrease in quality before the next cut. Such cuttings help the landowner immediately, too. The owner's income from the sale can pay for removal of cull timber, planting where necessary, or other practices to establish a thrifty forest. Many an acre today is being clearcut when it should have been subjected to an improvement cut.



Oaks growing on abandoned house sites are generally full of metal and should be deadened to permit the next generation to grow.



Loblolly pine seedlings and saplings in this stand need release from the overtapping oak.

## SUGGESTED READING

1. Bull, H.  
1934. Profit from improving a second-growth forest of loblolly and shortleaf pines and hardwood. U.S. Dep. Agric. South. For. Exp. Sta. Occas. Paper 38, 8 pp.
2. Bull, H.  
1938. Board-foot growth after improvement cutting. Southern Lumberman 158(1985):154-156
3. Bull, H.  
1944. Growing more wood on fewer trees. Southern Lumberman 169(2129):195-198
4. Johnson, J. W.  
1951. Improvement cutting in bottomland hardwoods. Southern Lumberman 183(2297):195-197
5. McKnight, J. S. and McWilliams, J. S.  
1957. Improving southern hardwood stands through commercial harvest and cull-tree control. Soc. Amer. For. Proc. 1956:71-72
6. Putnam, J. A. and Bull, H.  
1940. Improvement cuttings in the bottomland hardwood forests of Mississippi. U.S. Dep. Agric. South. For. Exp. Sta. Occas. Paper 93, 14 pp.
7. Putnam, J. A., Furnival, G. M. and McKnight, J. S.  
1960. Management and inventory of southern hardwoods. U.S. Dept. Agric., Agric. Handb. 181, 102 pp.
8. Reynolds, R. R.  
1939. Improvement cuttings in shortleaf and loblolly pine. J. For. 37:568, 569
9. Reynolds, R. R.  
1966. 1966 Harvest, Crossett Farm Forestry Forties. U.S. Dep. Agric. For. Serv., Res. Note SO-47, 4 pp. South. For. Exp. Stn., New Orleans, La.
10. Summers, J. H.  
1958. Improvement cuttings in southern hardwoods. Proc. Seventh Annual For. Symposium La. State Univ., pp. 64-69.
11. Williston, H. L. and Rawls, I. W.  
1947. Building up a poorly stocked farm forest. U.S. Dep. Agric. For. Serv., South. For. Exp. Stn., Occas. Paper 110, 7 pp.

If you no longer wish to receive this publication, please check here ☐ and return this sheet, or addressed portion of envelope in which publication was mailed.

If your address should be changed ☐ PRINT or TYPE the new address, including ZIP CODE, and return the whole sheet.

U. S. DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
SUITE 901 1720 PEACHTREE ST., N.W.  
ATLANTA, GEORGIA 30309

POSTAGE AND FEES PAID  
U. S. DEPARTMENT OF AGRICULTURE  
AGR-101

